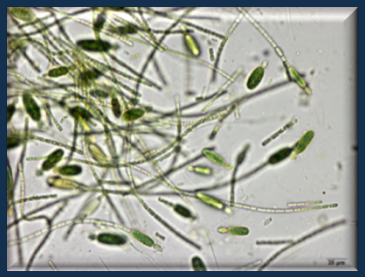
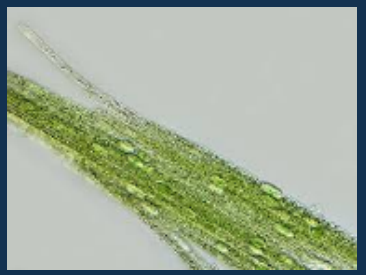






UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
WATER
QUALITY

Harmful Algal Bloom Program Update - 2020

Erica Brown Gaddis, PhD, Director

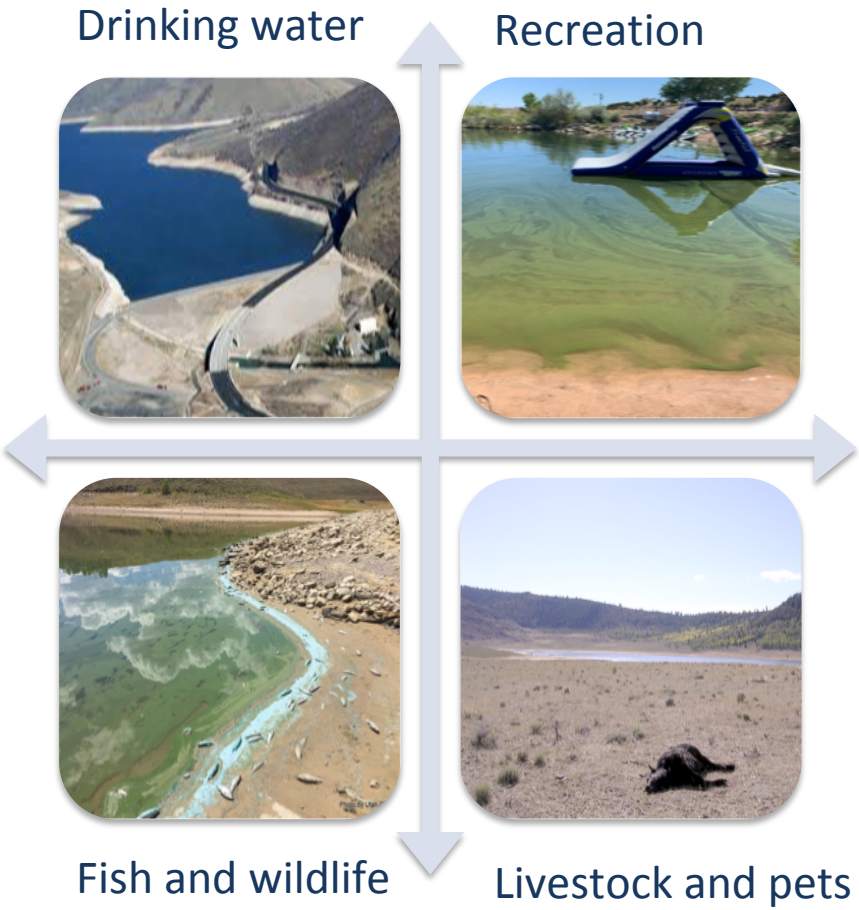
Water Quality and Public Health

Vision: Clean air, land and water for a healthy and prosperous Utah

UTAH DEPARTMENT *of*
ENVIRONMENTAL
QUALITY

Harmful Algal Blooms

High concentrations of cyanobacteria that may produce toxins



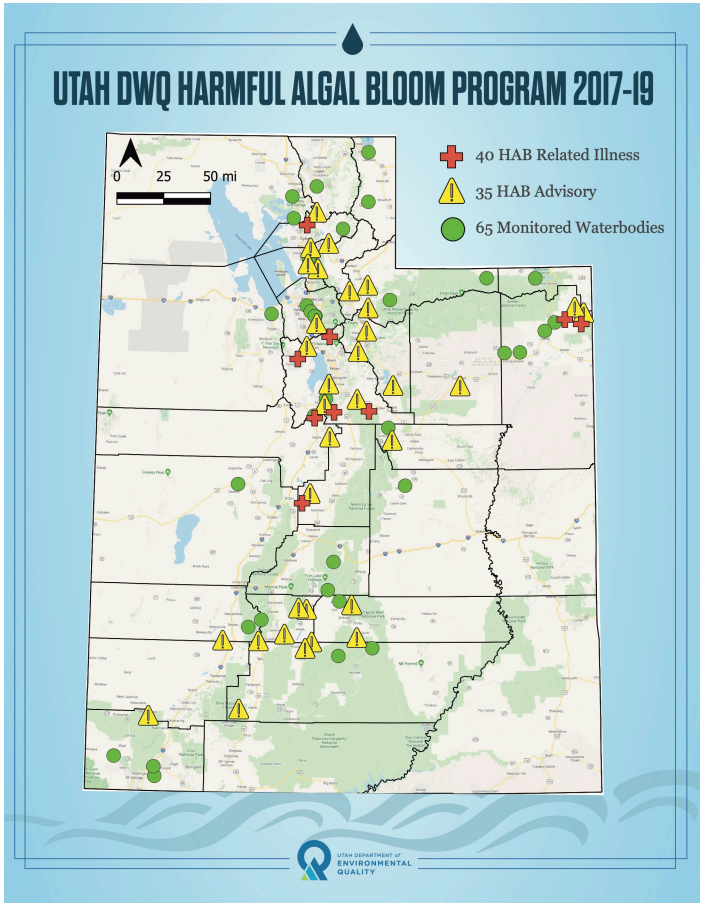
Utah Poison Control Center HAB Reports

Cases reported

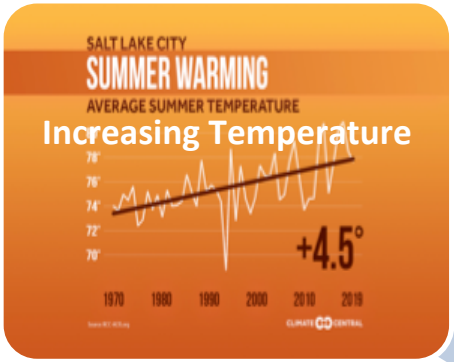
- 2016: 676 cases (32% adverse effects)
- 2017: 173 cases (30% adverse effects)
- 2018: 224 cases (30% adverse effects)
- 2019: 285 cases (23% adverse effects)
- 2020 (Aug 9): 114 cases (38% adverse effects)

Symptoms reported

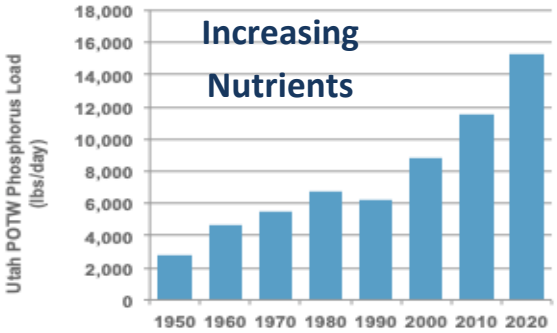
- Gastrointestinal: diarrhea, nausea, vomiting, and abdominal pain
- Skin: irritation
- Neuro: headache, dizziness



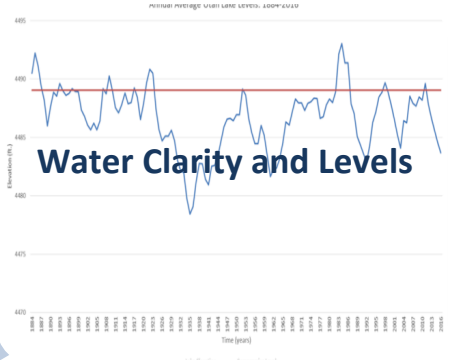
Factors Contributing to Algal Blooms



Increasing Temperature



Increasing Nutrients



Water Clarity and Levels

Harmful Algal Bloom Management

Prevention

- Root causes
- Utah Lake Study

Mitigation

- Health advisories
- Education

Treatment

- Algaecides
- Harvesting

Monitoring

DWQ HAB Advisory Process

Monitoring

Routine
Monitor prioritized lakes on a monthly basis

Response
Monitor lakes on advisory on a weekly basis

Data Collected
Microcystin and Anatoxin-a
Cell Count (Taxonomy)

Detection

Inform LHD
Present data collected along with DWQ recommendation. Assist in answering site specific questions.

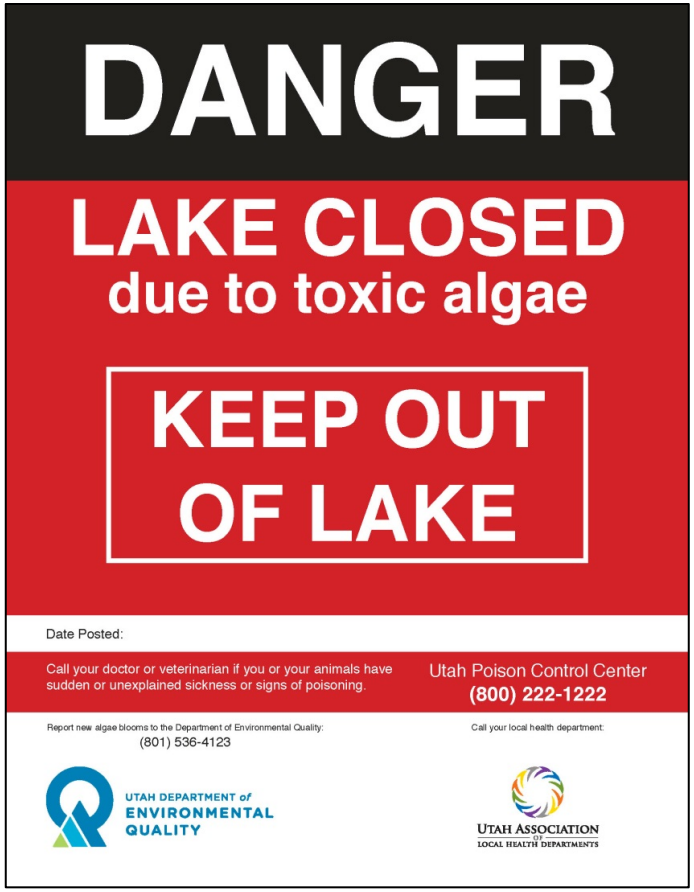
Communication
Phone call with all stakeholders (i.e. DNR, USFS, etc.) for site specific context

Advisory

Signs
Work with LHD and partners to post signs, make sure signs get posted

Communication
Alert stakeholders to advisory decision. Post information, maps, and narrative about advisory on habs.utah.gov

2016 Utah Lake



2016 Utah Lake → Jordan River

2016 Scofield Reservoir

- Fish kill
- Bat and bird mortalities
- Threatened Price City drinking water intake

Water Quality Health Advisory Panel

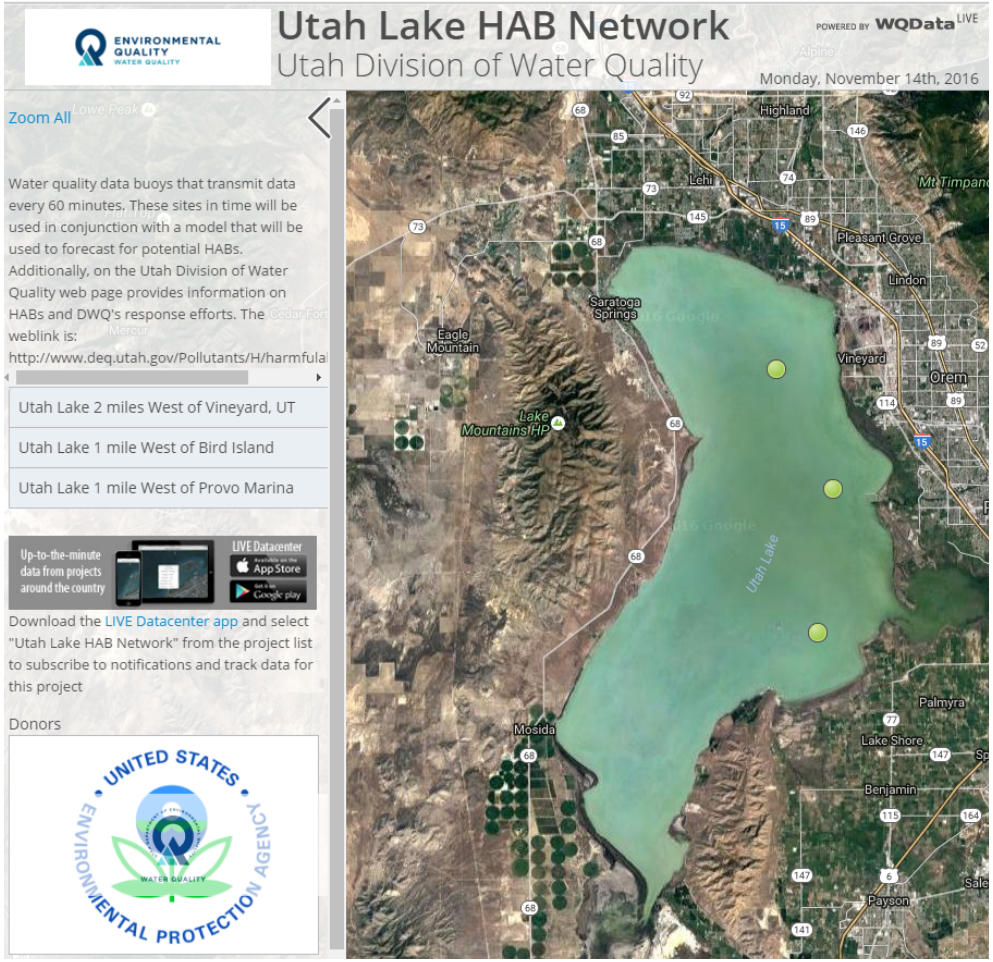
Established in 2016

Coordinate and communicate on water quality issues associated with public health

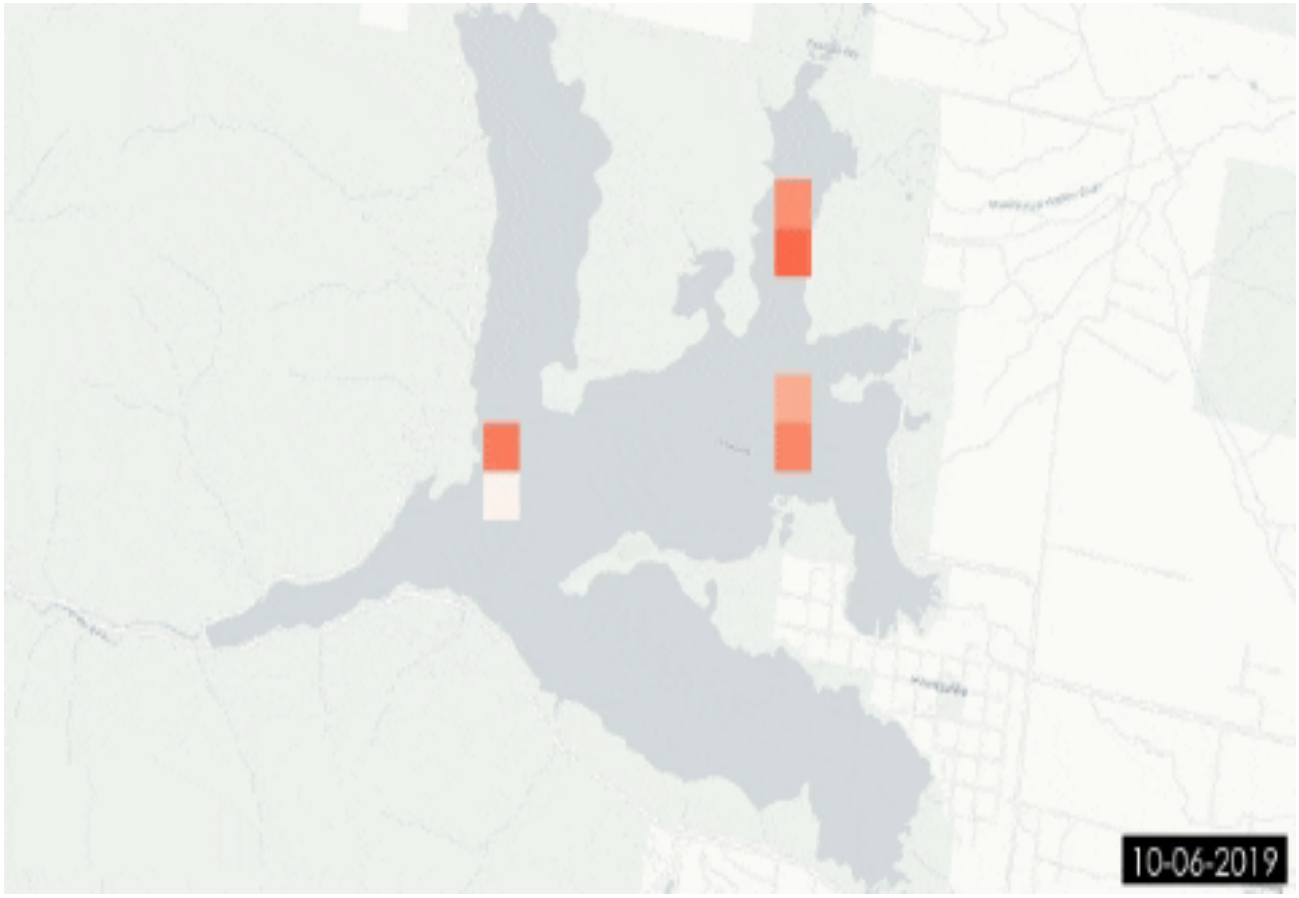
And……other experts and stakeholders

2017 HAB Program Improvements

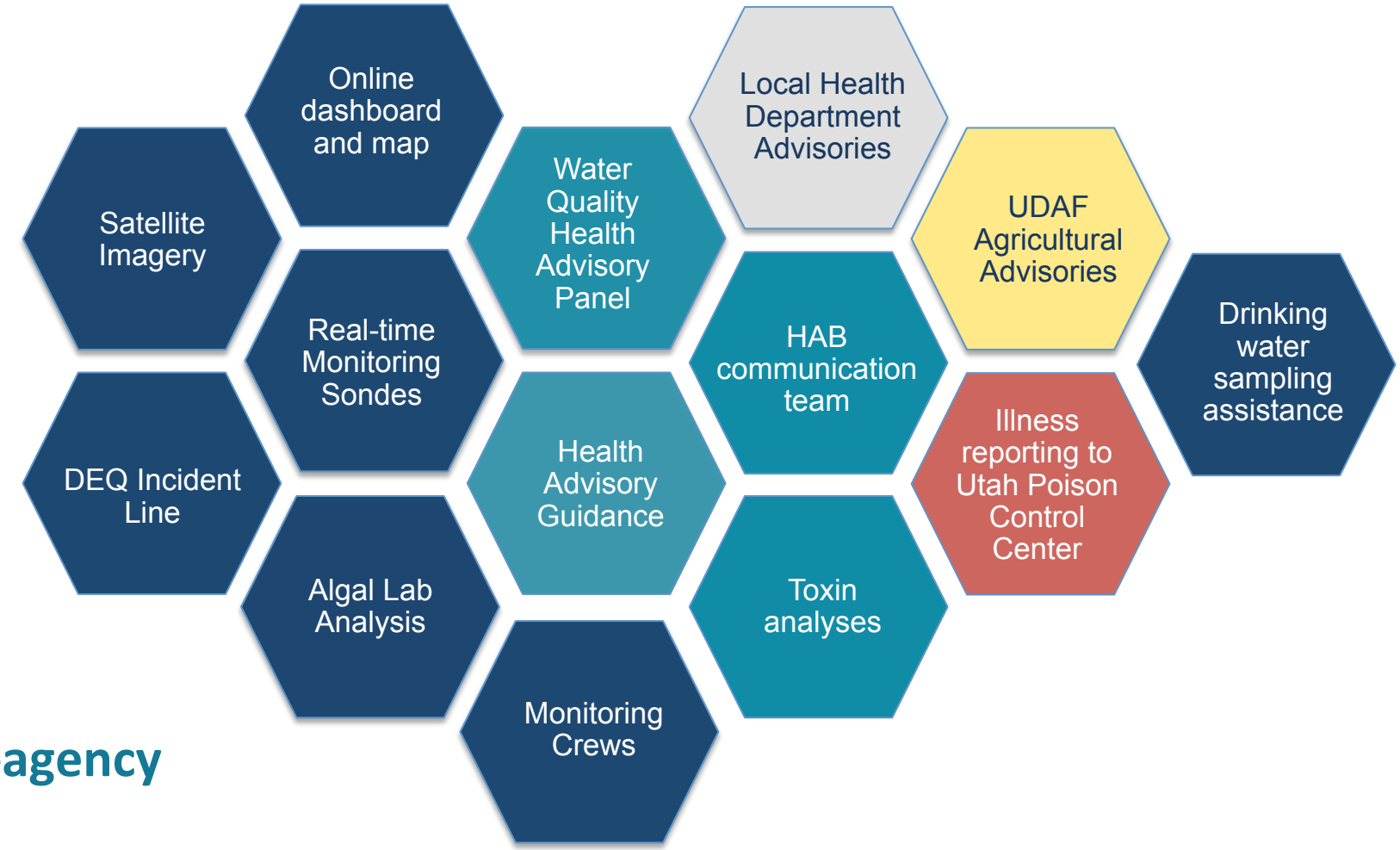
- Early warning system in high risk waters: Utah Lake, Scofield, Deer Creek
- New testing capability in-state at Utah Public Health Laboratory
- Updated guidance for local health departments
- Coordinated response planning across local and state agencies



Satellite Imagery: Helps inform and guide



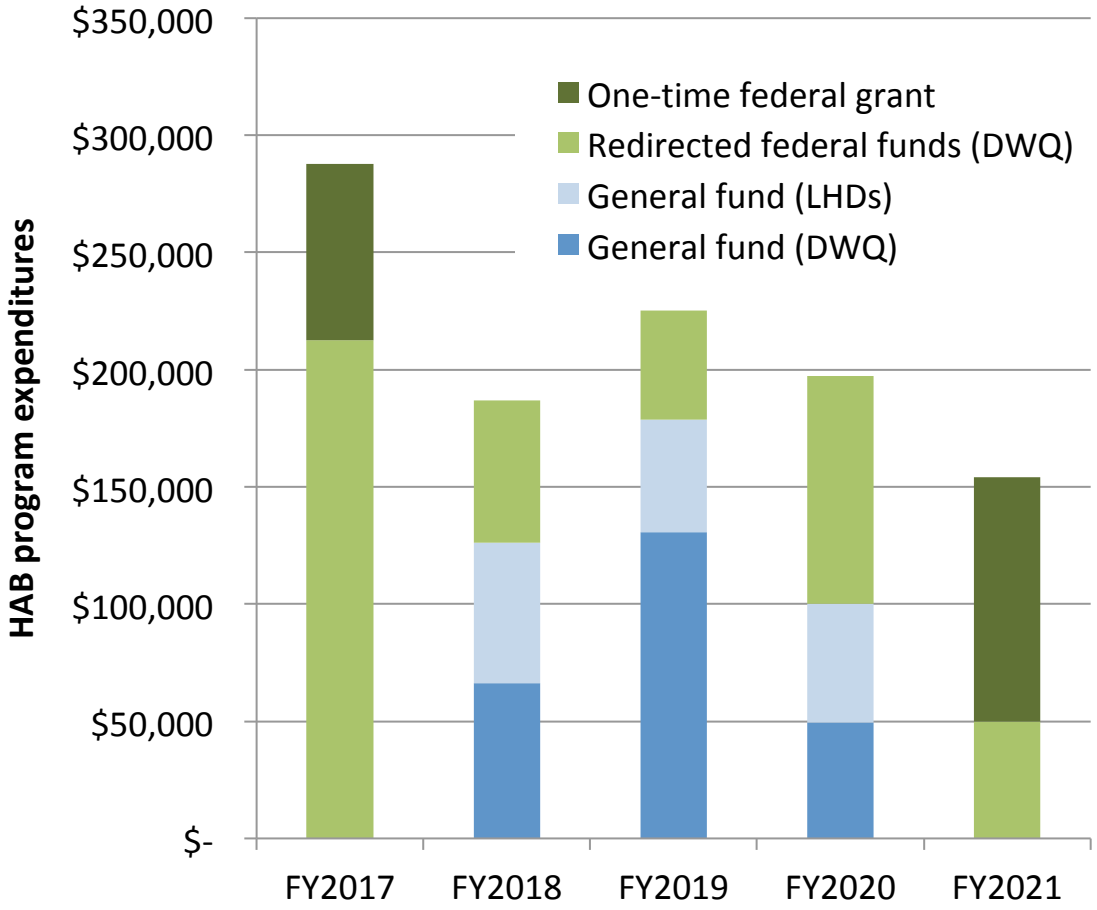
HAB Advisory Program Elements



UDEQ

Multi-agency

HAB program funding history



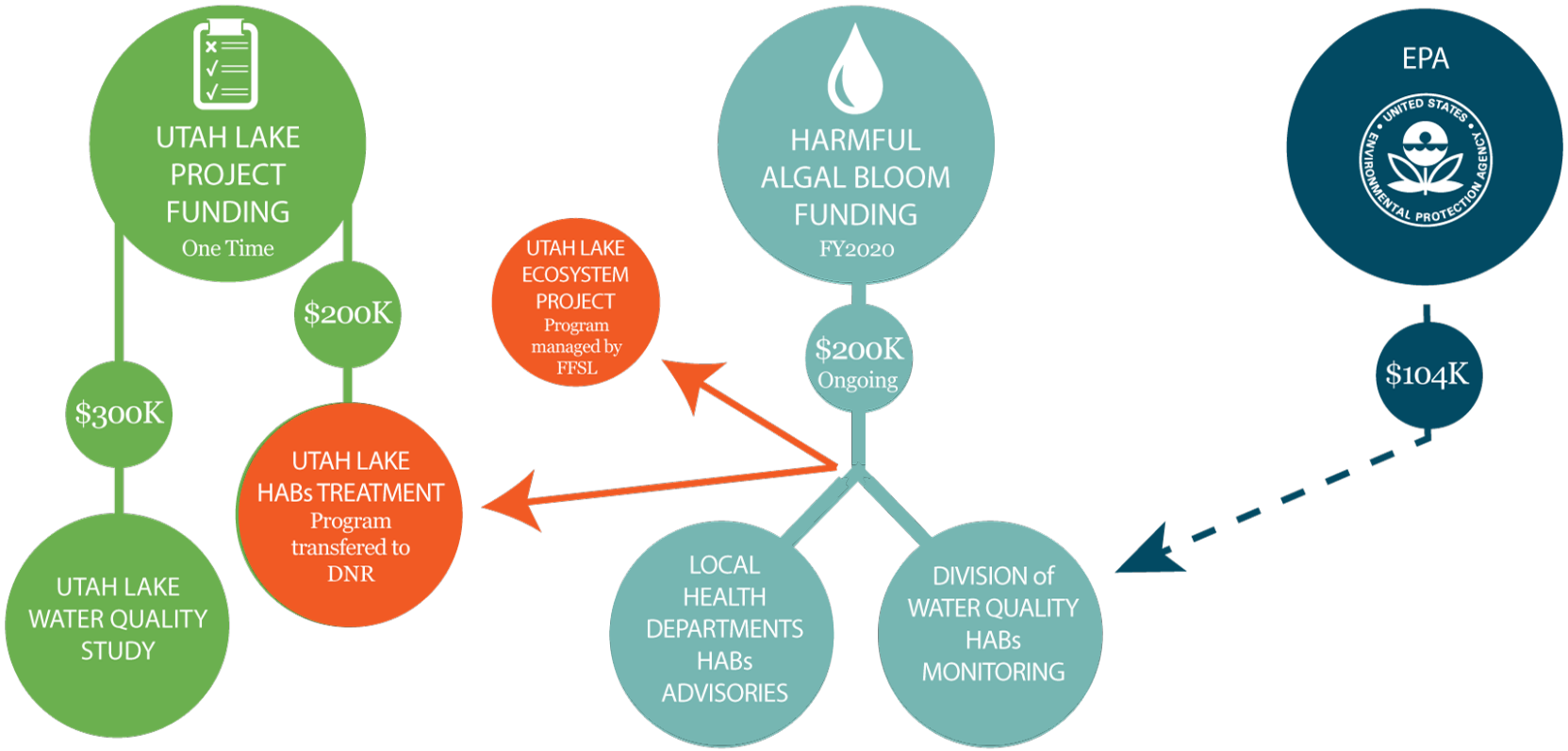
General Fund Building Blocks

FY18 (supplemental): $126,000
FY19 (one-time): $178,500
FY20 (ongoing): $200,000
FY20 (supplemental): $-100,000
FY21: $0

Funded Activities

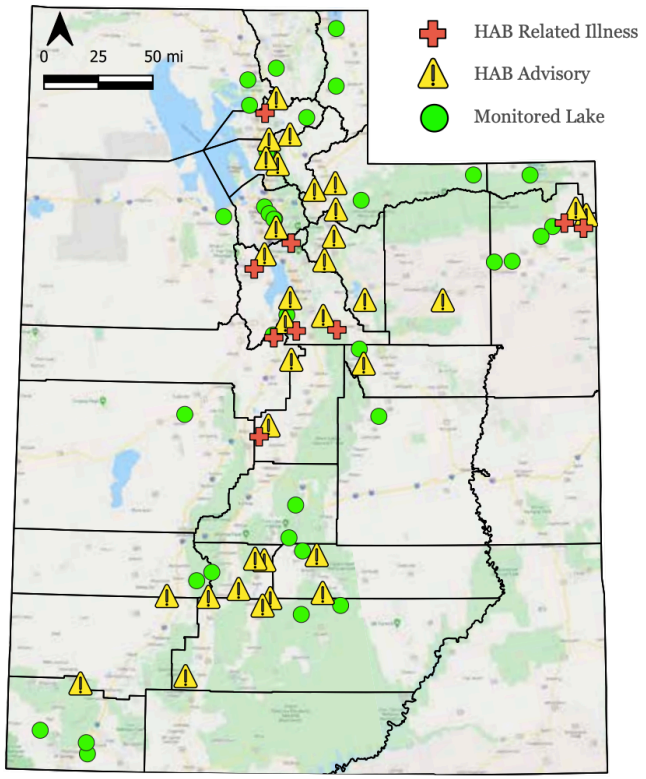
Monitoring of 60+ waterbodies
More frequent sampling
LHD Advisory Process

2020 Harmful Algal Bloom Funding Issues



2020 Reduced Program Activities

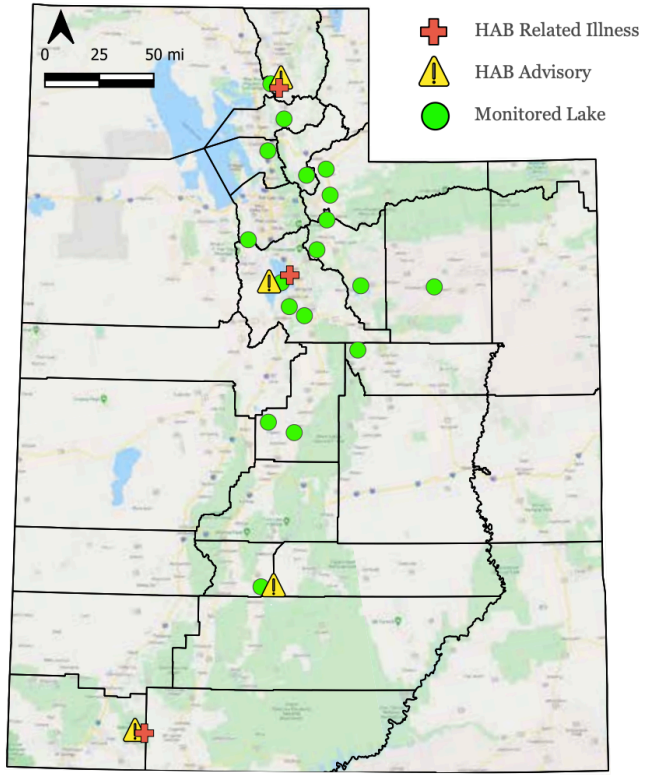
UTAH HARMFUL ALGAL BLOOM PROGRAM 2017-19



2017 - 2019

Water bodies monitored: 65
Water bodies with advisories: 35
HAB related illnesses: 40

UTAH HARMFUL ALGAL BLOOM PROGRAM 2020



2020

Water bodies monitored: 18
Water bodies with advisories: 4
HAB related illnesses: 43

Current Lake Advisories

Mantua Reservoir

Bear River Health Dept

- Report of dog death
- Algal density

Utah Lake Marinas (American Fork, Lindon, Lincoln)

Utah County HD

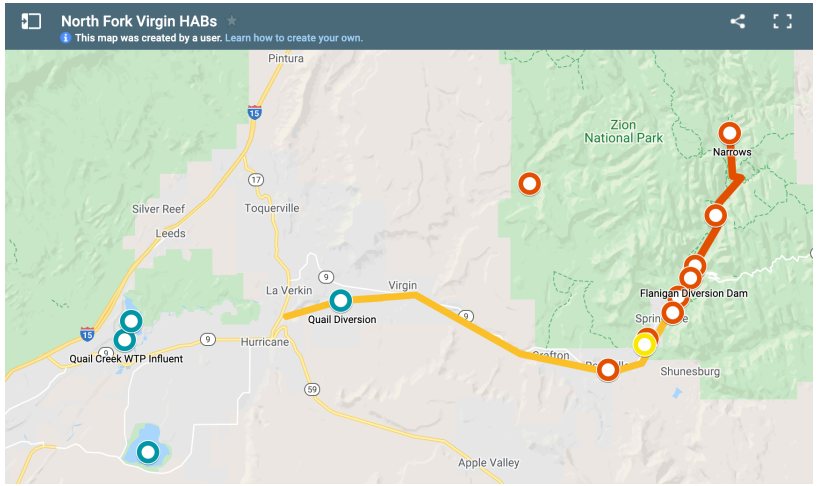
- Algal density
- Microcystin

Otter Creek Reservoir,

Central Utah HD

- Algal density

Virgin River - Zion National Park



Report of dog death after snapping at algae in Virgin River, Zion NP

Anatoxin-a confirmed in algal mats

Zion NP and Southwest HD issued health advisories

Drinking water and secondary water for several communities – no indication of toxins

Monitoring is ongoing

HAB Advisory Program Elements


Questions &
Discussion

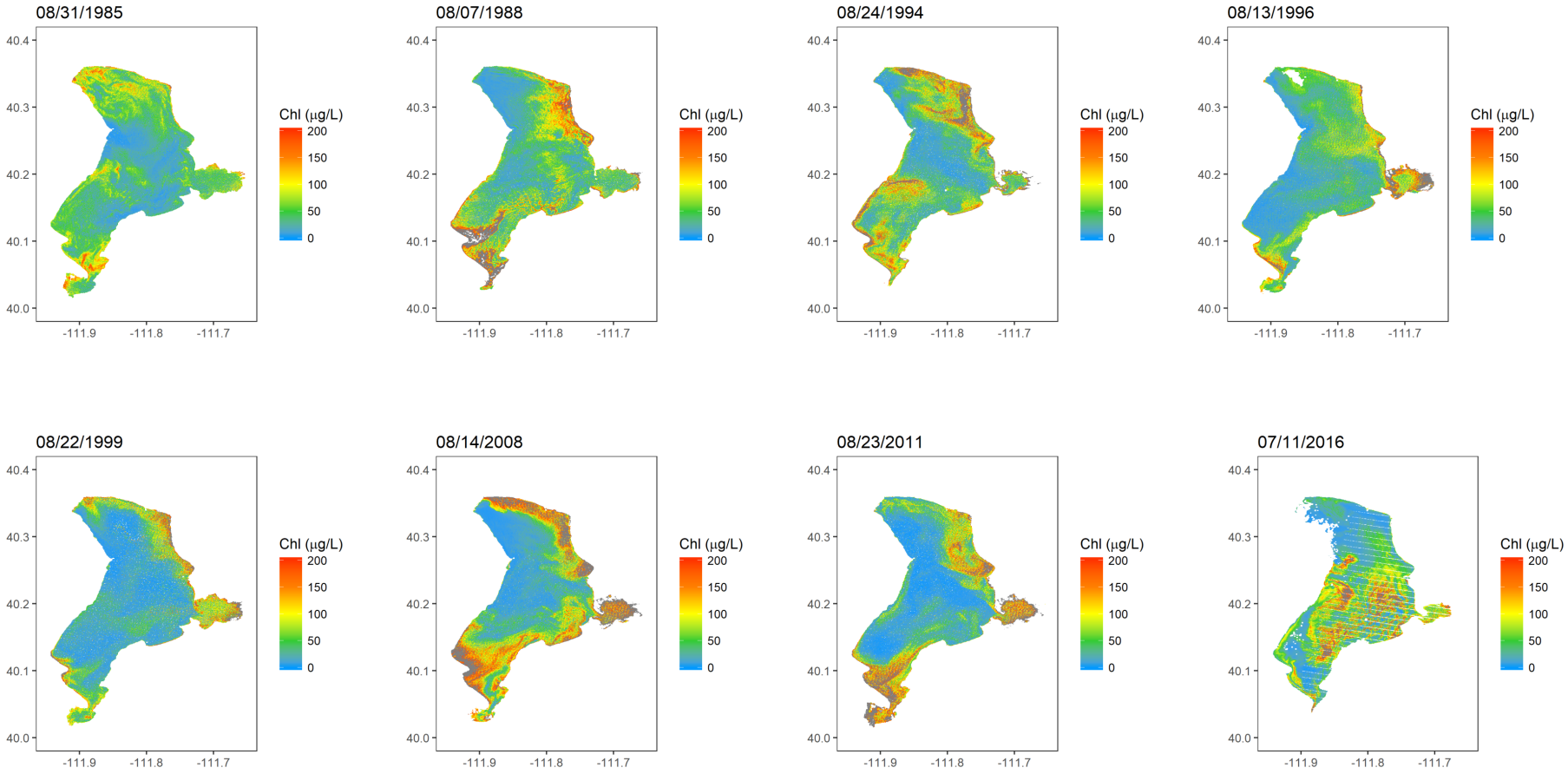
2018 - 2019 Advisory Thresholds

	Warning	Danger
Relative Probability of Acute Health Risk	Moderate	High
Cyano Cell Density (cells/mL)	20,000	10,000,000
Microcystin (ug/L)	4	2,000
Cylindrospermopsin (ug/L)	8	8
Anatoxin-a (ug/L)	Detection	90
Health Risks	-Potential for long-term illness -Short term effects (e.g. skin and eye irritation, nausea, vomiting, diarrhea)	-Potential for acute poisoning -Potential for long-term illness -Short term effects (e.g. skin and eye irritation, nausea, vomiting, diarrhea)

2020 Advisory Thresholds

	Warning	Danger
Relative Probability of Acute Health Risk	Moderate	High
Cyano Cell Density (cells/mL) Toxigenic species only	~~20,000~~ 100,000	10,000,000
Microcystin (ug/L)	~~4~~ 8	2,000
Cylindrospermopsin (ug/L)	~~8~~ 15	~~8~~ 15
Anatoxin-a (ug/L)	~~Detection~~ 15	90
Health Risks	-Potential for long-term illness -Short term effects (e.g. skin and eye irritation, nausea, vomiting, diarrhea)	-Potential for acute poisoning -Potential for long-term illness -Short term effects (e.g. skin and eye irritation, nausea, vomiting, diarrhea)

Historic blooms

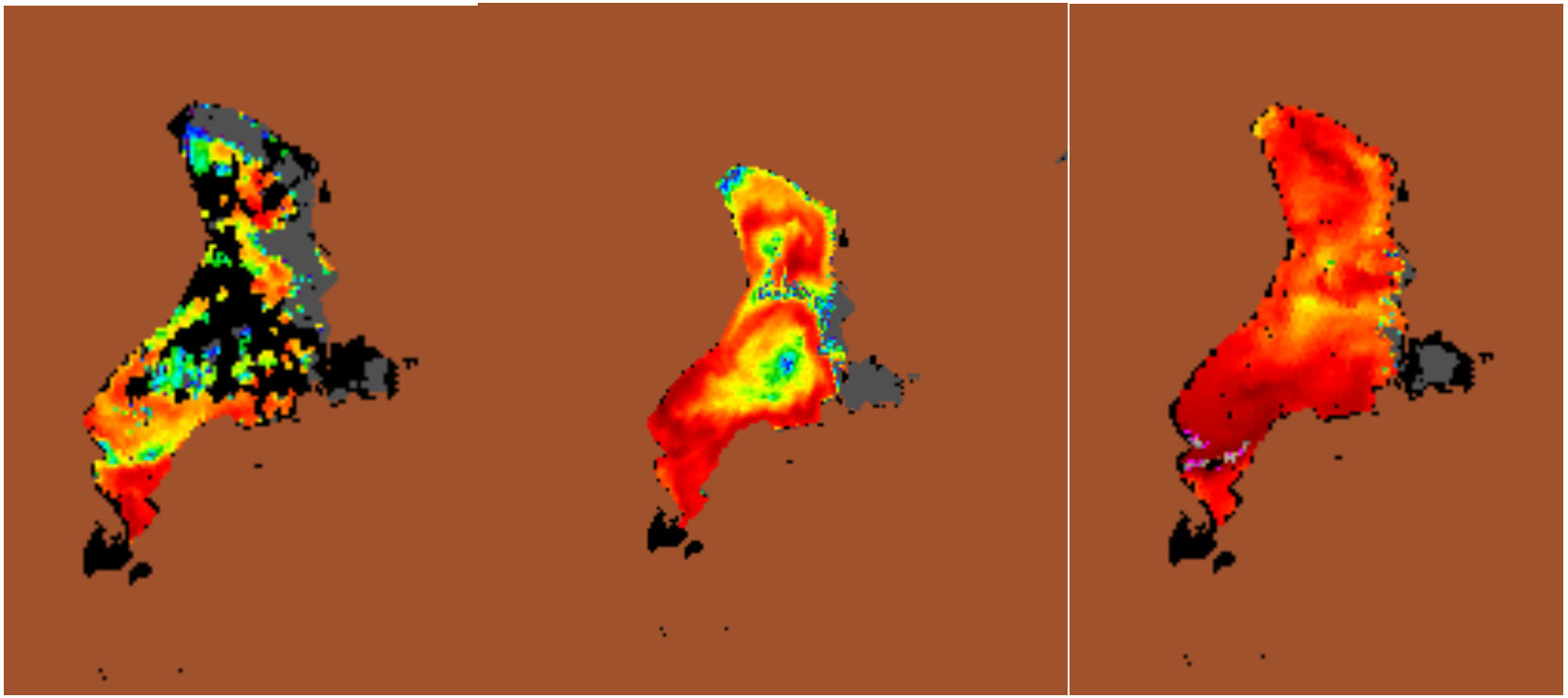


Hansen et al. 2018

Harmful Algal Bloom Funding History

Year	Program Costs	Funding sources	Notes
FY2017	$212,629	Diverted funds from federally mandated programs	5-years to catch-up with mandate
FY2018	$239,184	General fund (supplemental): $126,200 Federal programmatic grant: $60,684	Redirected resources from biological assessment program
FY2019	$246,541	General fund (one-time): $178,500 Federal programmatic grant: $46,541	
FY2020	$197,176	General fund: $200,000 (ongoing) - $100,000 (supplemental cut) Federal programmatic grant: $97,176	No monitoring April – June 2020
FY2021	$154,000	General fund: $0 USEPA one-time grant: $104,000 Federal programmatic grant: $50,000	Scaled back monitoring due to budget

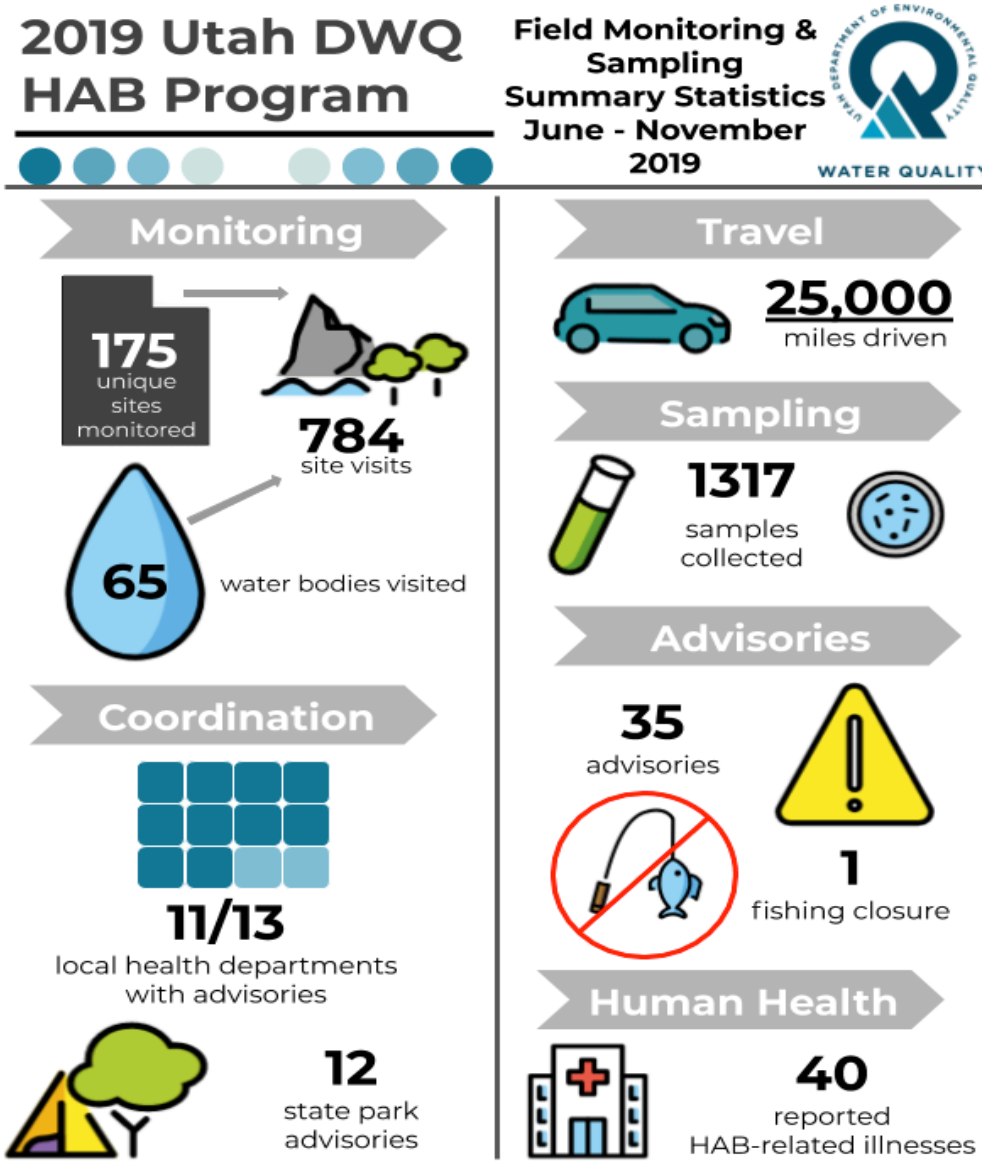
2018 Activity



July 28, 2018

July 31, 2018

August 5, 2018


2019 Utah DWQ HAB Program
Field Monitoring & Sampling Summary Statistics June - November 2019
WATER QUALITY
Monitoring
175 unique sites monitored
784 site visits
65 water bodies visited
Coordination
11/13 local health departments with advisories
12 state park advisories
Travel
25,000 miles driven
Sampling
1317 samples collected
Advisories
35 advisories
1 fishing closure
Human Health
40 reported HAB-related illnesses

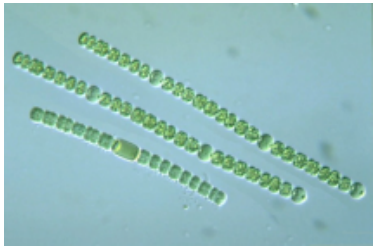
Cyanobacteria and cyanotoxins

Liver, nerve, or skin toxins

Selectively produced by many genera but not very predictable

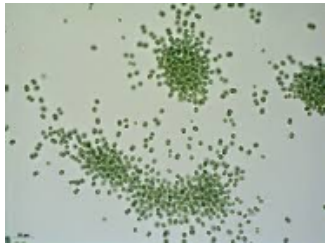
Widely distributed but not often at acutely toxic levels

Analyses are available for some *but not all* of these toxins



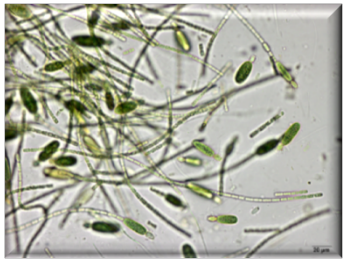
Dolichospermum

-Anatoxin-a/a(s) (nerve)
-Saxitoxins (nerve)
-Microcystins (liver)



Microcystis

-Microcystins (liver)
-Toxin is most common and easily measured
-100 congeners



Cylindrospermopsis

-Cylindrospermopsins (liver)
-Saxitoxins (nerve)
-Benthic/epiphytic rather than planktonic

Nodularia

- Nodularins (liver)
- Found in brackish water including bays of Great Salt Lake

Aphanizomenon

-Anatoxins (nerve)
-Cylindrospermopsins (liver)
-Saxitoxins (nerve)

Harmful Algal Bloom Building Blocks

FY18 (supplemental): $126,000

FY19 (one-time): $178,500

FY20 (ongoing): $200,000

Statewide bloom monitoring

- 130 monitoring locations
- 60+ waterbodies
- More frequent sampling

Local Health Department Support

Field based toxin testing

Monitoring support and advisory program

Monitoring and Sampling on Utah Lake